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Factors that influence global literacy: what is the most dominant?

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ABSTRACT

Global literacy is a crucial ability to maintain the world's peace. Several studies show that demographic factors influence the development of a person's competence. However, the influence of demographic factors on global literacy has not yet been explored, especially in high school students. This research was conducted to determine the factors that most influence students' global literacy in biology learning. The factors used in this research are gender, school profile (public or private school), and interest in learning biology. This study used a cross-sectional survey design with 2,759 students participating. Students' global literacy was analyzed from a questionnaire of four aspects: exploration, communication, using the internet, and act for society. This study found that all the proposed factors influence students' global literacy, but the factor that has the most dominant influence is the school profile. This research provides a new view regarding the influence of demographic factors on students' global literacy. The government and related parties can use these results to design effective learning innovations to develop students' global literacy.

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1. INTRODUCTION

Globalization affects every aspect of society, including beliefs, norms, values, and behavior, even in the economic field. Most countries have increasing diversity due to worldwide migration [1], [2]. This condition forces countries to rethink citizenship and civic education [3]. The significant changes in society have led to the need to review the models underlying traditional citizenship and increasingly focus on alternative, cosmopolitan, and multicultural models of citizenship.

Differences in social backgrounds, culture, language, religion, and economic status of various communities and countries can be a potential source of economic [4], culture exchange [5], and technology transfer [6], [7]. Even in negative terms, diversity can trigger cases of intolerance or conflicts of interest [8]–[10]. Incidents of discrimination can take the form of bullying and intolerant attitudes towards religious, ethnic, and cultural differences between communities, causing friction between horizontal and vertical conflicts among global citizens. On the other hand, the potential diversity of global society can be developed in learning to realize quality education following the goals of education in the sustainable development goals (SDGs) [11]–[13]. To discover the integration of global literacy in learning, studying students' literacy profiles is necessary. Information on demographic factors can be a potential reference for an efficient process of developing students' global literacy.

Globalization is not something that happens in a short time. This process requires a trial and is human development. Globalization is often described as a positive development in terms of the understanding that we as humans form one race and must share one planet [14]. However, the negative impact of many inequalities, unfair trade regulations, and fear of other customs and beliefs in globalization has also given rise to anti-global solid movements and nationalism. [15]. The nationalistic school of thought provides an overly simplistic and even detrimental portrait of a complex and multidimensional conflict. Rather than deglobalizing and giving rise to new problems that cannot be predicted, training global literacy in the younger generation is the wisest way.

Global literacy is described as awareness, reading, and understanding of current political, social, economic, and environmental issues that enable individuals to fulfill their role as influential global citizens [16]. New reasoning and knowledge built from global literacy developments can be fostered by identifying, interpreting, analyzing, and synthesizing information to develop and share new knowledge. Based on several research results [17], [18], global literacy can be formed in a lesson by interacting with students. Good literacy skills will familiarize students with learning to receive, understand, and apply the information in everyday life [19].

Biology learning has the potential to develop students' global literacy. Biology examines various phenomena and natural phenomena that occur in human life [20], [21]. Biology is objective and can be proven. Science is a body of knowledge obtained through methods based on observation and reasoning [22]. Based on a needs analysis of the objectives of biology education, it can currently be classified into five necessary measures: knowledge and understanding (basic scientific), observation and discovery, scientific process, creativity and productivity, attitude/scientific, and the value of truth in its application. Various research results in biology, either directly or indirectly, can be used and utilized by humans in their daily lives [23]. Having global literacy qualities will help individuals have a successful human profile and contribute at both individual and universal levels [24]. This quality of global literacy causes individuals to see the world with their own senses, evaluate it with their own thought systems, and act with a feeling of being part of society and the world. This achievement will develop students of all ages into responsible global citizens with values, knowledge, and skills based on human rights, social justice, diversity, gender equality, and environmental sustainability [16].

This study aimed to determine the factor that most influence students' global literacy in studying biology. The factors used in this study were gender, school profile (public or private school), and interest in studying biology. This research provides new insight into the influence of demographic factors on students' global literacy. Studies on this theme are still rarely explored, especially among high school students. Researchers and the government can use this data to develop integrated learning that accommodates the development of students' global literacy and improves the quality of curriculum and school management. Integrated learning has been proven to have the potential to improve students' thinking abilities and understanding [25], [26].

2. METHOD

2.1. Research design

This study used a cross-sectional survey design [27]. The choice to use a cross-sectional design was influenced by the researcher's ability to obtain a sample that represented the population well and obtain survey results efficiently [28]. Cross-sectional designs have been proven to be used to measure literacy skills [29], [30].

2.2. Participant

Participants who were involved in this survey came from almost all provinces in Indonesia. A total of 2,759 high school students participated in this survey. Samples were selected randomly and voluntarily from each province. About three-quarters of the participants came from public schools (73%) and were female (72%). Most of the participants had an interest in learning biology. Complete participant demographics can be seen in Table 1.

Table 1. Demographic characteristics of participants

Criteria	Group	Total	Percentage (%)
Gender	Female	1,996	72.3
	Male	763	27.7
School profile	Public	2,038	73.29
	Private	721	26.1
Interest in learning biology	Yes	2,308	83.7
	No	451	16.3

2.3. Instrument and data collection

The survey was conducted during February until March 2023. Participants selection used the snowball method [31]. The questionnaire underwent a validation stage with several experts and was tested. The questionnaire was entered into a Google Form and then distributed by researchers to teacher's community groups in each province. Teachers could disseminate the questionnaire information to other teachers and their students. For ethical considerations, students had the opportunity not to be involved in this research. The questionnaire aimed to measure students' global literacy.

The questionnaire comprised 20 questions (exploration=two questions, communication=six questions, using the internet=three questions, action for the community=nine questions). The questionnaire consists of 5 criteria: one describes strongly disagree, and five represents strongly agree with the statement. The instrument used in this study was a questionnaire based on the criteria developed by Nguyen *et al*. [32]. Before data collection, the questionnaire was tested for validity and reliability. The instrument's validity is measured using the corrected item discrimination (r) value. The r value ranges from 0.57 to 0.85, with p-value <0.05, so all items are valid. Reliability analysis was carried out using Cronbach's alpha (α). Cronbach alpha is used because it is the most appropriate test to measure the instrument's reliability [33]. The instrument is reliable if the score exceeds 0.08 [33]. The results of the test instrument reliability were as: exploration (α=0.84), communication (α=0.83), using the internet (α=0.88), action for the community (α=0.81), and the whole instrument (α=0.89).

2.4. Analysis

The researcher downloaded the data from the Google Form. Researchers sorted the data obtained and deleted duplicate data that not meeting the criteria. In total, there were 2,811 responses. After going through the sorting process, there were 2,759 data used. The analysis was carried out quantitatively. Quantitative analysis was used in the form of descriptive analysis and inferential analysis. Descriptive analysis was used to analyze respondents' demographic data. Inferential analysis (Mann-Whitney test) was used to determine the effect of demographic factors such as gender, school profile, and interest in learning biology. Regression tests were also used to see which factors influenced students' global literacy the most.

3. RESULTS AND DISCUSSION

This research aims to determine the factors that most influence students' global literacy in biology learning. Analysis of the influence of each factor on students' global literacy was also carried out to determine the effects in more detail. School profile has the most significant role in students' global literacy. More detailed results show that all factors have an influence on students' global literacy. However, gender factors do not have an influence on all indicators of students' global literacy. Teachers can practically use these results to develop their biology learning, especially by incorporating global literacy.

3.1. The factors that most influence students' global literacy

Based on the analysis, the student's school profile has the highest effect on students' global literacy. This was followed by interest in learning biology and gender factors. These results are shown in Table 2.

3.2. The effect of school profile on global literacy of high school students

The results of the analysis of the influence of school profile on students' global literacy show that school profile has a significant influence on students' global literacy in each indicator. Students from private schools have higher scores in all indicator. These results are shown in Table 3.

The study results show that school origin affects students' global literacy, in this case, public and private schools. However, this result is also influenced by the quality of teachers in different private and public schools. Private teachers have higher technological readiness than public teachers [34], [35]. In Indonesia, teachers from private schools have higher technological readiness than public schools [36]. However, this condition will also definitely influence the learning climate used by teachers. Learning using technology is more interesting for students [37]. Using technology allows teachers to carry out varied and innovative learning regarding methods and learning resource materials. In public schools, several cases show that they have less motivation to develop because they already have guarantees from the government [38].

Another argument that strengthens these results is that technological progress is related to global literacy [16]. The use of technology allows various information from all over the world to be accessed so that the introduction of global literacy to students can also be carried out as entirely as possible. Information from across national borders is more accessible for students to obtain so that students' insights about the world can increase. In the context of learning, the teacher can ask students to find information about culture, language, and education in other countries and then ask students to take good practices. The flow of information received will increase students' tolerance for the diversity that exists in the world.

Table 2. Results of analysis of factors that most influence students' global literacy

Model		Unstandardized coefficients	
		B	Standard error
1	(Constant)	4.338	0.068
	Gender	0.099	0.027
	School profile	-0.198	0.027
	Interest in learning biology	-0.182	0.032

Table 3. Results of analysis of the effect of school profile on global literacy of high school students

Variable	Exploration		Communication		Using internet		Act for society	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
School								
Public	4.158	0.837	3.798	0.712	3.778	0.667	3.703	0.624
Private	4.334	0.846	3.926	0.748	3.996	0.698	3.932	0.630
z-score	-6.473		-5.111		-8.115		-9.360	
Sig.	0.000		0.000		0.000		0.000	

3.3. The effect of gender on global literacy of high school students

The results of the analysis of the effect of gender on students' global literacy show that gender influences students' global literacy. In more detail, each indicator of the exploration aspect has a significant influence, while other factors do not. The average obtained shows that male students tend to have higher global literacy scores. In more detail, these results can be seen in Table 4.

The main results of this research show that gender as a whole influences students' global literacy. Many studies have been conducted regarding the influence of gender on literacy in general [39]–[41]. Based on research by Borgonovi *et al*. [41] the literacy gap between males and females is very significant yearly. It was further explained that the literacy gap between males and females increases with age. Men have higher literacy than women. A similar study in Asia conducted by Chen *et al*. [42] also shows that gender significantly affects literacy. However, there have not been many studies regarding the influence of gender on global literacy, so the results of this research can be used as a new view on the influence of gender on global literacy.

Furthermore, men tend to be more curious than women [43], [44]. Most biologists propose that boys and girls have innate differences from birth related to biological factors (e.g., genetic differences; behavioral differences are also influenced by genetics, although the environment also plays a role). In subsequent developments, for example, differences in concentrations of androgen and estrogen hormones also influence individual behavior [45]. This difference in behavior and curiosity will further affect their literacy. Literacy is an individual's awareness to act according to his knowledge [46], so differences in biological factors in males and females will have an influence.

Table 4. Results of analysis of the effect of gender on global literacy of high school students

Variable	Exploration		Communication		Using internet		Act for society	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Gender								
Female	4.160	0.865	3.818	0.726	3.828	0.701	3.745	0.641
Male	4.320	0.769	3.867	0.718	3.854	0.629	3.809	0.612
z-score	-4.398		-.743		-.250		-1.629	
Sig.	0.000		0.457		0.803		0.103	

3.4. The effect of interest in learning biology on global literacy of high school students

The analysis of the effect of interest in learning on global literacy shows that interest in learning biology influences students' global literacy in every aspect. Students who have an interest in studying biology have higher global literacy than students who do not have the motivation to study biology. In more detail, these results can be seen in Table 5.

The results of this study indicate that learning interest in biology affects students' global literacy. Interest in learning that students own will affect the involvement and seriousness of students in learning [47]. Students who are interested in a course can put more effort into completing assignments in learning. Learning biology (sciences) usually involves various kinds of exploration [21], [48]. The investigation carried out by students has a high possibility of being carried out in cases outside their country. Students have more opportunities to learn the language and culture of the country where they study.

Table 5. Analysis of the effect of interest in studying biology on global literacy of high school students

Variable	Exploration		Communication		Using internet		Act for society	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Interest in learning biology								
Yes	4.235	0.815	3.875	0.710	3.858	0.676	3.789	0.622
No	4.047	0.958	3.701	0.779	3.719	0.703	3.628	0.675
z-score	-3.520		-4.678		-4.113		-5.409	
Sig.	0.000		0.000		0.000		0.000	

Additional arguments emphasize the pedagogical benefits of gender studies as they relate to students' global literacy. Global literacy is related to phenomena that students often see in their daily lives, so it has an excellent opportunity to be used in learning to make it more contextual and meaningful [49]. For example, when there is a food crisis in another area, students can learn how to cultivate modified crops [50]. In another context related to global climate change, students can study it independently and develop alternative solutions based on their thoughts. The development of students' global literacy combined with the principles of learning biology can guide students in understanding the current global conditions so that they will be more aware of maintaining world peace. This opportunity can be used to bridge the integration of global literacy, learning biology, and the daily lives of students who have been separated [51], [52].

4. CONCLUSION

The results of this research show that the factor that most influences students' global literacy is school profile. Students from private schools have higher scores in global literacy. Apart from that, the factor of gender affects global literacy. Male students have higher scores than female students. Interestingly, interest in learning biology affects students' global literacy. Students interested in studying biology have higher scores in global literacy. Therefore, an effort must be made to promote global literacy in biology learning. Biology learning is suitable for developing global literacy because it is exploratory. Based on the results of this research, teachers, academics, or the government need to establish an integrative learning model or strategy to develop students' global literacy. Global literacy is vital for students amidst the increasingly fading borders between countries.

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